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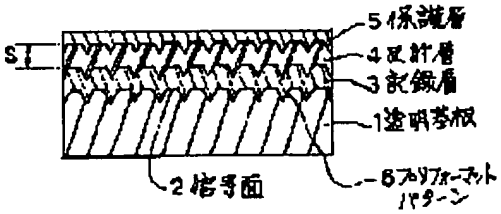
(54) OPTICAL INFORMATION RECORDING MEDIUM



(57)Abstract:
PURPOSE: To provide the optical information recording medium of an org. dye system having an excellent long-term preservable property of information.
CONSTITUTION: The optical information recording medium constituted by depositing at least an org. dye layer 3 and a metallic layer 4 laminated on this org. dye layer 3 is provided on a signal surface 2 of a transparent substrate 1. This metallic layer 4 is formed of an alloy material essentially consisting of at least one kind of the metal elements selected from [gold, silver; copper, and aluminum] element groups and at least one kind of the metal elements selected from [tin, indium, germanium, silicon, lead, gallium, thalium, antimony, bismuth, and Zinc] element groups.

LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] In the optical information record medium which comes at least to support an organic-coloring-matter layer and the metal layer by which the laminating was carried out on this organic-coloring-matter layer to the signal side of a transparence substrate At least one kind of metallic element chosen from the [gold, silver, copper, and aluminum] element group in the above-mentioned metal layer, [Tin, an indium, germanium, silicon, lead, a gallium, a thallium, antimony, a bismuth, and Zinc] Optical information record medium characterized by forming at least one kind of metallic element chosen from the element group with the alloy ingredient used as a principal component.

[Claim 2] The optical information record medium characterized by carrying out the laminating of the record auxiliary layer in which it was formed in an inorganic compound or organic polymeric materials on the above-mentioned metal layer, and the thickness was adjusted to 0.1 micrometers - 3.0 micrometers in the claim 1 publication.

[Claim 3] The optical information record medium characterized by forming the above-mentioned organic-coloring-matter layer in the mixture of cyanine system coloring matter and aminium system coloring matter in claim 1 publication.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the added type light information record medium of a postscript which can be applied to the added type light information record medium equipped with the organic-coloring-matter layer and the metal layer of a postscript, and can add information in more detail using a laser beam, and can reproduce information using a commercial compact disk (CD) player or a videodisk (VD) player.

[0002]

[Description of the Prior Art] In recent years, the so-called development of the optical information record medium with which the output signal which has a high reflection factor and is based on CD format on the occasion of informational playback is acquired and which can be written in, and a recordable CD is briskly performed with the spread of CDs.

[0003] The recordable CD proposed conventionally as indicated by JP,2-164586,A It is the thing which comes to carry out the laminating of an organic-coloring-matter layer, a metallic reflective layer, and the ultraviolet-rays hardenability resin layer that is a protective layer to the signal side of a transparence substrate one by one. While making an organic-coloring-matter layer absorb a laser beam, changing into heat, deteriorating the organic-coloring-matter ingredient itself which

constitutes an organic-coloring-matter layer with the heat and changing the optical property, it is characterized by making some transparence substrates which are the substrates of this section deform, and recording information.
[0004]
[Problem(s) to be Solved by the Invention] Generally organic coloring matter deteriorates by sunlight, and an optical property changes with time. When moisture intervenes especially, change of the above-mentioned optical property becomes remarkable, and the function as an optical information record medium is lost within a short period of time. When an organic-coloring-matter layer deteriorates, information comes to be recorded by only deformation of a transparence substrate and it becomes impossible to maintain with time 30% or more of signal modulation factor which is CD specification, since the above-mentioned conventional recordable CD is recording information according to change of the optical property of an organic-coloring-matter layer, and deformation of a transparence substrate.
[0005] This invention is made in order to solve this technical problem, it is excellent in informational mothball nature, and aims at offering the optical information record medium of a CD player or the postscript mold in which playback by VD player is possible.
[0006]
[Means for Solving the Problem] In the optical information record medium which comes at least to support an organic-coloring-matter layer and the metal layer by which the laminating was carried out on this organic-coloring-matter layer to the signal side of a transparence substrate in order that this invention may attain the above-mentioned purpose At least one kind of metallic element chosen from the [gold, silver, copper, and aluminum] element group in the above-mentioned metal layer, [Tin, an indium, germanium, silicon, lead, a gallium, a thallium, antimony, a bismuth, and Zinc] At least one kind of metallic element chosen from the element group was formed with the alloy ingredient used as a principal component.
[0007]
[Function] If a metal layer is formed with the above-mentioned alloy ingredient, the melting point and the heat conductivity can fall compared with the case where pure gold, virgin silver, a pure copper, and pure aluminium are used, and it can be made to deform easily according to an operation of the heat or gas which occurs by irradiating the laser beam for record at an organic-coloring-matter layer, or these both. Therefore, since it can leave information in the form of a pit even if an organic-coloring-matter layer deteriorates, a high signal modulation factor is maintainable over a long period of time. In addition, although it has 30% or more of signal modulation factor, and 70% or more of reflection factor and is indispensable in order to reproduce information in a CD player or VD player, it is checked by experiment by adjusting suitably the presentation of the above-mentioned alloy ingredient which constitutes a metal layer that these values are fully clearable.
[0008]
[Example] Drawing 1 - drawing 4 explain one example of this invention. The important section sectional view in which the important section sectional view of the optical information record medium which drawing 1 requires for this example, and drawing 2 show a top view, and drawing 3 shows the configuration of the Records Department, and drawing 4 are the important section sectional views showing other examples of the configuration of the Records Department.
[0009] As shown in drawing 1 , the optical information record medium of this example carries out the laminating of the organic-coloring-matter layer 3, the metal layer 4, and the record auxiliary layer 5 to the signal side 2 of the transparence substrate 1 one by one, and becomes it

from the transparence substrate 1 side.
[0010] The transparence substrate 1 has transparent plastic material, such as a polycarbonate, poly methine methacrylate, the poly methyl pentene, polyolefine, and epoxy, and transparence ceramic ingredients, such as glass, and is formed in a desired configuration and a desired dimension. The signal patterns 6 showing the guide rail and header signal for showing a laser beam spot to the signal side 2, such as a PURIPITTO train, are formed in detailed concave convex. The above-mentioned signal pattern 6 is formed the shape of spirally or a concentric circle of the transparence substrate 1 and this alignment, as shown in drawing 2 . In addition, since it is the matter which belongs well-known and there is no direct relation to the summary of this invention about the formation approach of the signal pattern 6, explanation is omitted.
[0011] As an organic-coloring-matter ingredient which constitutes the organic-coloring-matter layer 3, organic-coloring-matter ingredients of difficulty water solubility, such as poly methine system coloring matter, anthraquinone system coloring matter, cyanine system coloring matter, phthalocyanine system coloring matter, a xanthene dye, triphenylmethane color system coloring matter, pyrylium system coloring matter, azulene system coloring matter, and metal-containing azo dye, can be used, for example. The organic-coloring-matter layer 3 can be formed by carrying out the spin coat of 1 chosen from the above-mentioned organic-coloring-matter group, or the solvent solution of two or more kinds of mixtures to the signal side 2 of the above-mentioned transparence substrate 1.
[0012] The metal layer 4 is formed with the alloy which uses as a principal component at least one kind of metallic element chosen from the [gold, silver, copper, and aluminum] element group, and at least one kind of metallic element chosen from the [tin, indium, germanium, silicon, lead, gallium, thallium, antimony, bismuth, and Zinc] element group. Although it can be set as arbitration if needed, since the thickness can form the high record pit of a modulation factor, especially its thing set to 40nm - 110nm is desirable. In addition, this metal layer 4 does not necessarily need to be formed in a monolayer, and can also be formed in the layered product of two or more thin films with which presentations differ. The metal layer 4 can be formed when sputtering or vacuum deposition carries out a desired alloy ingredient.
[0013] The record auxiliary layer 5 is formed by forming, when sputtering or vacuum deposition carries out inorganic materials, such as SiO2, TiO2, ZnO, TiN, SiN, AlN, and aluminum 2O3, or carrying out spin spreading of the organic polymeric materials, such as acrylic resin, polyamide system resin, vinyl system resin, an epoxy resin, and a silane coupling agent. Among these, since membrane formation is easy, especially ultraviolet-rays hardenability resin, such as acrylic resin, is desirable.
[0014] If the optical information record medium of the above-mentioned example carries out incidence of the laser beam for record by which the signal modulation was carried out by predetermined methods, such as CD format, from the transparence substrate 1 side and focuses in the above-mentioned organic-coloring-matter layer 3, it will be absorbed by the organic-coloring-matter ingredient with which the light energy constitutes the organic-coloring-matter layer 3, and will be changed into heat energy. And the laser beam exposure section for record of the above-mentioned organic-coloring-matter layer 3 is deteriorated, and it changes with the heat, the optical property of light absorption, for example, the rate, of this section. Moreover, with this, cubical expansion or gas occurs in the laser beam exposure section 8 for record of the organic-coloring-matter layer 3, and the record pit 9 as shown in drawing 3 or drawing 4 is formed in the metal layer 4 of an operation of the expansion pressure or gas pressure, and heat. Record of the information on desired is performed by this.

[0015] At the time of playback, by low power, the laser beam for playback of fixed reinforcement which does not make any change to an optical information record medium cause, either is irradiated, and the reflected light from an optical information record medium is detected rather than the laser beam for record. Since the reflected light reinforcement from the part which received deterioration of the organic-coloring-matter layer 3 and deformation of the metal layer 4 at the time of record differs from the reflected light reinforcement from the part which did not receive above-mentioned deterioration and deformation at the time of record clearly, a signal modulation is carried out by the part which received above-mentioned deterioration and deformation, and the laser beam for playback of fixed reinforcement is read as a regenerative signal.
[0016] In addition, informational record can also be performed on a guide rail and it can also carry out to the flat part between the guide rails which adjoin each other. However, since it is hard to diffuse heat compared with the case where it records on the flat part between guide rails, it is advantageous when the direction recorded on Mizogami raises record sensibility more.
[0017] Below, below the example of an experiment is shown and effectiveness of this invention is clarified.
<Example 1 of an experiment> The optical disk concerning this invention was produced by the following approaches. First, the spin coat of the ethyl cel Cellosolve solution of the cyanine system coloring matter with which 20% of the weight of aminium system coloring matter was mixed is carried out, it dries to the signal side of a polycarbonate substrate, and the organic-coloring-matter layer whose thickness is 120nm is formed in it. Subsequently, on this organic-coloring-matter layer, vacuum deposition of the golden-tin alloy containing 10% of the weight of tin is carried out, and the metal layer whose thickness is 60nm is formed. Furthermore, the spin coat of the ultraviolet-rays hardenability resin is carried out on this metal layer, ultraviolet rays are irradiated, are stiffened, and the record auxiliary layer whose thickness is 1 micrometer is formed. Moreover, the optical disk concerning the conventional technique in which the metal layer made from pure gold whose thickness is 60nm was formed on the organic-coloring-matter layer was produced. About other conditions, it was made the same as the optical disk concerning said this invention. Drive equipment was equipped with the optical disk concerning the optical disk and the conventional technique concerning these this inventions, and data logging was performed on the conditions whose linear velocity is 1.25 m/s and whose record power is 5mW. After an appropriate time, these optical disks were put on the bottom of an environment with the temperature of 30 degrees C, a% [of relative humidity] of 80, and an illuminance of 10000 luxs, and change of the modulation factor of each of said optical disk and change of a reflection factor were measured for every fixed time amount. Change of a modulation factor is shown in drawing 5 , and change of a reflection factor is shown in drawing 6 . Since the record pit where a modulation factor falls [the optical disk of a gap], and it is clear in a metal layer even after an organic-coloring-matter layer is decolorized completely is formed by having followed on illumination degradation of an organic-coloring-matter layer as shown in drawing 5 , the optical disk concerning this invention is maintaining 30% or more of modulation factor required at a CD player or VD player to reproduce information. On the other hand, in the optical disk concerning the conventional technique, after an organic-coloring-matter layer is decolorized completely, only about 2 - 3% of mere modulation factor is maintainable. After 500-hour progress, although the optical disk concerning this invention was able to reproduce information when information was reproduced having covered both optical disks over the CD player, with the optical disk concerning the conventional technique, information was unreproducible. Moreover, although the

optical disk concerning this invention falls rather than the optical disk which requires a reflection factor for the conventional technique by alloying a metal layer, it has 70% or more of reflection factor required to reproduce information by the CD player or VD player, and there is no problem in informational playback in any way, so that clearly from drawing 6 . In fact, after 500-hour progress, although the optical disk concerning this invention was able to reproduce information when information was reproduced having covered both optical disks over the CD player, with the optical disk concerning the conventional technique, information was unreproducible.

[0018] <Example 2 of an experiment> The various optical disks with which the metal layer was formed with the various golden-tin system alloys with which tin contents differ were produced. About other conditions, it was made the same as the above-mentioned example 1 of an experiment. Drive equipment was equipped with these optical disks, data logging was performed on the conditions whose linear velocity is 1.25 m/s and whose record power is 5mW, and the modulation factor obtained by after an appropriate time and the reflection factor of each optical disk were measured. The result is shown in drawing 7 . Since the melting point of a metal layer will fall and it will become easy to deform if a tin content is increased in a golden-tin system alloy so that clearly from this drawing, record sensibility improves and a big modulation factor is obtained. On the other hand, a reflection factor falls as a tin content increases. Since 70% or more of reflection factor is required at a CD player or VD player to reproduce information as described above, in using a golden-tin system alloy as a metal layer ingredient, it turns out from drawing 7 that it is necessary to make a tin content 20% or less.

[0019] <The example 3 of an experiment> The optical disk with which the organic-coloring-matter layer shown in the example 1 of an experiment was formed in the signal side of a polycarbonate substrate, the metal layer which comes to carry out the laminating of the golden-tin alloy film containing 30% of the weight of tin and the pure-gold film one by one was formed on this organic-coloring-matter layer, and the record auxiliary layer made of ultraviolet-rays hardenability resin shown in the example 1 of an experiment was further formed on this metal layer produced. And the same experiment as the example 1 of an experiment was conducted about this optical disk. Consequently, by adjusting suitably the thickness of the golden-tin alloy film and the pure gold film showed that there was the same property as the optical disk concerning this invention which could obtain 70% or more of reflection factor, and was shown in drawing 5 and drawing 6 .

[0020] <Example 4 of an experiment> The optical disk of the versatility in which the various record auxiliary layers from which thickness differs were formed, and the optical disk which does not have a record auxiliary layer were produced. About other conditions, it was made the same as the above-mentioned example 1 of an experiment. Drive equipment was equipped with these optical disks, data logging was performed on the conditions whose linear velocity is 1.25 m/s and whose record power is 5mW, and the modulation factor and the block error rate of each optical disk which are obtained by after an appropriate time were measured. The result is shown in drawing 8 . A modulation factor can be raised, if close relation is between the thickness of the record auxiliary layer made of ultraviolet-rays hardening resin, the modulation factor obtained, and a block error rate and the record auxiliary layer of a certain amount of thickness is formed on a metal layer so that clearly from this drawing. When a record auxiliary layer is too thin, the heat generated in the organic-coloring-matter layer is transmitted to a metal layer, the thing with a low modulation factor is easy to diffuse it, and when a record auxiliary layer is too thick, it is presumed that the thing with a low modulation factor is because the reinforcement of a record auxiliary layer becomes high too much and deformation of a metal layer is controlled. If

thickness of a record auxiliary layer is especially set to 0.1 micrometers or less, it will be difficult to form a stable record pit, and a block error rate will increase rapidly. From these things, the thickness of a record auxiliary layer is understood that especially the thing set to 0.1 micrometers - about 3 micrometers is desirable.
[0021] In addition, in said example of an experiment, although only the example of an experiment of the optical disk equipped with the metal layer of a golden-tin system was hung up, the result with the same said of the optical disk equipped with the metal layer which consists of other alloys was obtained.
[0022]
[Effect of the Invention] As explained above, the optical information record medium of this invention At least one kind of metallic element chosen from the [gold, silver, copper, and aluminum] element group in the metal layer, [tin, an indium, germanium, silicon, lead, a gallium, a thallium, Since it forms with antimony, a bismuth, and the alloy ingredient that uses as a principal component at least one kind of metallic element chosen from the Zinc] element group and the record pit was formed in the metal layer Even if an organic-coloring-matter layer deteriorates, it can leave information in the form of a pit, and informational mothball nature can be improved.

TECHNICAL FIELD

[Industrial Application] This invention relates to the added type light information record medium of a postscript which can be applied to the added type light information record medium equipped with the organic-coloring-matter layer and the metal layer of a postscript, and can add information in more detail using a laser beam, and can reproduce information using a commercial compact disk (CD) player or a videodisk (VD) player.

PRIOR ART

[Description of the Prior Art] In recent years, the so-called development of the optical information record medium with which the output signal which has a high reflection factor and is based on CD format on the occasion of informational playback is acquired and which can be written in, and a recordable CD is briskly performed with the spread of CDs.
[0003] The recordable CD proposed conventionally comes to carry out the laminating of an organic-coloring-matter layer, a metallic reflective layer, and the ultraviolet-rays hardenability resin layer that is a protective layer to the signal side of a transparence substrate one by one as indicated by JP,2-164586,A. While being, making an organic-coloring-matter layer absorb a laser beam, changing into heat, deteriorating the organic-coloring-matter ingredient itself which constitutes an organic-coloring-matter layer with the heat and changing the optical property, it is characterized by making some transparence substrates which are the substrates of this section deform, and recording information.

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, it is the optical information record medium of this invention, At least one kind of metallic element chosen from the [gold, silver, copper, and aluminum] element group in the metal layer, [tin, an indium, germanium, silicon, lead, a gallium,

a thallium, Since it forms with antimony, a bismuth, and the alloy ingredient that uses as a principal component at least one kind of metallic element chosen from the Zinc] element group and the record pit was formed in the metal layer Even if an organic-coloring-matter layer deteriorates, it can leave information in the form of a pit, and informational mothball nature can be improved.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Generally organic coloring matter deteriorates by sunlight, and an optical property changes with time. When moisture intervenes especially, change of the above-mentioned optical property becomes remarkable, and the function as an optical information record medium is lost within a short period of time. When an organic-coloring-matter layer deteriorates, information comes to be recorded by only deformation of a transparence substrate and it becomes impossible to maintain with time 30% or more of signal modulation factor which is CD specification, since the above-mentioned conventional recordable CD is recording information according to change of the optical property of an organic-coloring-matter layer, and deformation of a transparence substrate.

[0005] This invention is made in order to solve this technical problem, it is excellent in informational mothball nature, and aims at offering the optical information record medium of a CD player or the postscript mold in which playback by VD player is possible.

MEANS

[Means for Solving the Problem] In the optical information record medium which comes at least to support an organic-coloring-matter layer and the metal layer by which the laminating was carried out on this organic-coloring-matter layer to the signal side of a transparence substrate in order that this invention may attain the above-mentioned purpose At least one kind of metallic element chosen from the [gold, silver, copper, and aluminum] element group in the above-mentioned metal layer, [Tin, an indium, germanium, silicon, lead, a gallium, a thallium, antimony, a bismuth, and Zinc] At least one kind of metallic element chosen from the element group was formed with the alloy ingredient used as a principal component.

OPERATION

[Function] If a metal layer is formed with the above-mentioned alloy ingredient, the melting point and the heat conductivity can fall compared with the case where pure gold, virgin silver, a pure copper, and pure aluminium are used, and it can be made to deform easily according to an operation of the heat or gas which occurs by irradiating the laser beam for record at an organic-coloring-matter layer, or these both. Therefore, since it can leave information in the form of a pit even if an organic-coloring-matter layer deteriorates, a high signal modulation factor is maintainable over a long period of time. In addition, although it has 30% or more of signal modulation factor, and 70% or more of reflection factor and is indispensable in order to reproduce information in a CD player or VD player, it is checked by experiment by adjusting suitably the presentation of the above-mentioned alloy ingredient which constitutes a metal layer that these values are fully clearable.

EXAMPLE

[Example] Drawing 1 - drawing 4 explain one example of this invention. The important section sectional view in which the important section sectional view of the optical information record medium which drawing 1 requires for this example, and drawing 2 show a top view, and drawing 3 shows the configuration of the Records Department, and drawing 4 are the important section sectional views showing other examples of the configuration of the Records Department.
[0009] As shown in drawing 1 , the optical information record medium of this example carries out the laminating of the organic-coloring-matter layer 3, the metal layer 4, and the record auxiliary layer 5 to the signal side 2 of the transparence substrate 1 one by one, and becomes it from the transparence substrate 1 side.
[0010] The transparence substrate 1 has transparent plastic material, such as a polycarbonate, poly methine methacrylate, the poly methyl pentene, polyolefine, and epoxy, and transparence ceramic ingredients, such as glass, and is formed in a desired configuration and a desired dimension. The signal patterns 6 showing the guide rail and header signal for showing a laser beam spot to the signal side 2, such as a PURIPITTO train, are formed in detailed concave convex. The above-mentioned signal pattern 6 is formed the shape of spirally or a concentric circle of the transparence substrate 1 and this alignment, as shown in drawing 2 . In addition, since it is the matter which belongs well-known and there is no direct relation to the summary of this invention about the formation approach of the signal pattern 6, explanation is omitted.
[0011] As an organic-coloring-matter ingredient which constitutes the organic-coloring-matter layer 3, organic-coloring-matter ingredients of difficulty water solubility, such as poly methine system coloring matter, anthraquinone system coloring matter, cyanine system coloring matter, phthalocyanine system coloring matter, a xanthene dye, triphenylmethane color system coloring matter, pyrylium system coloring matter, azulene system coloring matter, and metal-containing azo dye, can be used, for example. The organic-coloring-matter layer 3 can be formed by carrying out the spin coat of 1 chosen from the above-mentioned organic-coloring-matter group, or the solvent solution of two or more kinds of mixtures to the signal side 2 of the above-mentioned transparence substrate 1.
[0012] The metal layer 4 is formed with the alloy which uses as a principal component at least one kind of metallic element chosen from the [gold, silver, copper, and aluminum] element group, and at least one kind of metallic element chosen from the [tin, indium, germanium, silicon, lead, gallium, thallium, antimony, bismuth, and Zinc] element group. Although it can be set as arbitration if needed, since the thickness can form the high record pit of a modulation factor, especially its thing set to 40nm - 110nm is desirable. In addition, this metal layer 4 does not necessarily need to be formed in a monolayer, and can also be formed in the layered product of two or more thin films with which presentations differ. The metal layer 4 can be formed when sputtering or vacuum deposition carries out a desired alloy ingredient.
[0013] The record auxiliary layer 5 is formed by forming, when sputtering or vacuum deposition carries out inorganic materials, such as SiO2, TiO2, ZnO, TiN, SiN, AlN, and aluminum 2O3, or carrying out spin spreading of the organic polymeric materials, such as acrylic resin, polyamide system resin, vinyl system resin, an epoxy resin, and a silane coupling agent. Among these, since membrane formation is easy, especially ultraviolet-rays hardenability resin, such as acrylic resin, is desirable.
[0014] If the optical information record medium of the above-mentioned example carries out incidence of the laser beam for record by which the signal modulation was carried out by

predetermined methods, such as CD format, from the transparence substrate 1 side and focuses in the above-mentioned organic-coloring-matter layer 3, it will be absorbed by the organic-coloring-matter ingredient with which the light energy constitutes the organic-coloring-matter layer 3, and will be changed into heat energy. And the laser beam exposure section for record of the above-mentioned organic-coloring-matter layer 3 is deteriorated, and it changes with the heat, the optical property of light absorption, for example, the rate, of this section. Moreover, with this, cubical expansion or gas occurs in the laser beam exposure section 8 for record of the organic-coloring-matter layer 3, and the record pit 9 as shown in drawing 3 or drawing 4 is formed in the metal layer 4 of an operation of the expansion pressure or gas pressure, and heat. Record of the information on desired is performed by this.

[0015] At the time of playback, by low power, the laser beam for playback of fixed reinforcement which does not make any change to an optical information record medium cause, either is irradiated, and the reflected light from an optical information record medium is detected rather than the laser beam for record. Since the reflected light reinforcement from the part which received deterioration of the organic-coloring-matter layer 3 and deformation of the metal layer 4 at the time of record differs from the reflected light reinforcement from the part which did not receive above-mentioned deterioration and deformation at the time of record clearly, a signal modulation is carried out by the part which received above-mentioned deterioration and deformation, and the laser beam for playback of fixed reinforcement is read as a regenerative signal.

[0016] In addition, informational record can also be performed on a guide rail and it can also carry out to the flat part between the guide rails which adjoin each other. However, since it is hard to diffuse heat compared with the case where it records on the flat part between guide rails, it is advantageous when the direction recorded on Mizogami raises record sensibility more.

[0017] Below, below the example of an experiment is shown and effectiveness of this invention is clarified.

<Example 1 of an experiment> The optical disk concerning this invention was produced by the following approaches. First, the spin coat of the ethyl cel Cellosolve solution of the cyanine system coloring matter with which 20% of the weight of aminium system coloring matter was mixed is carried out, it dries to the signal side of a polycarbonate substrate, and the organic-coloring-matter layer whose thickness is 120nm is formed in it. Subsequently, on this organic-coloring-matter layer, vacuum deposition of the golden-tin alloy containing 10% of the weight of tin is carried out, and the metal layer whose thickness is 60nm is formed. Furthermore, the spin coat of the ultraviolet-rays hardenability resin is carried out on this metal layer, ultraviolet rays are irradiated, are stiffened, and the record auxiliary layer whose thickness is 1 micrometer is formed. Moreover, the optical disk concerning the conventional technique in which the metal layer made from pure gold whose thickness is 60nm was formed on the organic-coloring-matter layer was produced. About other conditions, it was made the same as the optical disk concerning said this invention. Drive equipment was equipped with the optical disk concerning the optical disk and the conventional technique concerning these this inventions, and data logging was performed on the conditions whose linear velocity is 1.25 m/s and whose record power is 5mW. After an appropriate time, these optical disks were put on the bottom of an environment with the temperature of 30 degrees C, a% [of relative humidity] of 80, and an illuminance of 10000 luxs, and change of the modulation factor of each of said optical disk and change of a reflection factor were measured for every fixed time amount. Change of a modulation factor is shown in drawing 5 , and change of a reflection factor is shown in drawing 6 . Since the record pit where a

modulation factor falls [the optical disk of a gap], and it is clear in a metal layer even after an organic-coloring-matter layer is decolorized completely is formed by having followed on illumination degradation of an organic-coloring-matter layer as shown in drawing 5 , the optical disk concerning this invention is maintaining 30% or more of modulation factor required at a CD player or VD player to reproduce information. On the other hand, in the optical disk concerning the conventional technique, after an organic-coloring-matter layer is decolorized completely, only about 2 - 3% of mere modulation factor is maintainable. After 500-hour progress, although the optical disk concerning this invention was able to reproduce information when information was reproduced having covered both optical disks over the CD player, with the optical disk concerning the conventional technique, information was unreproducible. Moreover, although the optical disk concerning this invention falls rather than the optical disk which requires a reflection factor for the conventional technique by alloying a metal layer, it has 70% or more of reflection factor required to reproduce information by the CD player or VD player, and there is no problem in informational playback in any way, so that clearly from drawing 6 . In fact, after 500-hour progress, although the optical disk concerning this invention was able to reproduce information when information was reproduced having covered both optical disks over the CD player, with the optical disk concerning the conventional technique, information was unreproducible.

[0018] <Example 2 of an experiment> The various optical disks with which the metal layer was formed with the various golden-tin system alloys with which tin contents differ were produced. About other conditions, it was made the same as the above-mentioned example 1 of an experiment. Drive equipment was equipped with these optical disks, data logging was performed on the conditions whose linear velocity is 1.25 m/s and whose record power is 5mW, and the modulation factor obtained by after an appropriate time and the reflection factor of each optical disk were measured. The result is shown in drawing 7 . Since the melting point of a metal layer will fall and it will become easy to deform if a tin content is increased in a golden-tin system alloy so that clearly from this drawing, record sensibility improves and a big modulation factor is obtained. On the other hand, a reflection factor falls as a tin content increases. Since 70% or more of reflection factor is required at a CD player or VD player to reproduce information as described above, in using a golden-tin system alloy as a metal layer ingredient, it turns out from drawing 7 that it is necessary to make a tin content 20% or less.

[0019] <The example 3 of an experiment> The optical disk with which the organic-coloring-matter layer shown in the example 1 of an experiment was formed in the signal side of a polycarbonate substrate, the metal layer which comes to carry out the laminating of the golden-tin alloy film containing 30% of the weight of tin and the pure-gold film one by one was formed on this organic-coloring-matter layer, and the record auxiliary layer made of ultraviolet-rays hardenability resin shown in the example 1 of an experiment was further formed on this metal layer produced. And the same experiment as the example 1 of an experiment was conducted about this optical disk. Consequently, by adjusting suitably the thickness of the golden-tin alloy film and the pure gold film showed that there was the same property as the optical disk concerning this invention which could obtain 70% or more of reflection factor, and was shown in drawing 5 and drawing 6 .

[0020] <Example 4 of an experiment> The optical disk of the versatility in which the various record auxiliary layers from which thickness differs were formed, and the optical disk which does not have a record auxiliary layer were produced. About other conditions, it was made the same as the above-mentioned example 1 of an experiment. Drive equipment was equipped with these optical disks, data logging was performed on the conditions whose linear velocity is 1.25

m/s and whose record power is 5mW, and the modulation factor and the block error rate of each optical disk which are obtained by after an appropriate time were measured. The result is shown in drawing 8 . A modulation factor can be raised, if close relation is between the thickness of the record auxiliary layer made of ultraviolet-rays hardening resin, the modulation factor obtained, and a block error rate and the record auxiliary layer of a certain amount of thickness is formed on a metal layer so that clearly from this drawing. When a record auxiliary layer is too thin, the heat generated in the organic-coloring-matter layer is transmitted to a metal layer, the thing with a low modulation factor is easy to diffuse it, and when a record auxiliary layer is too thick, it is presumed that the thing with a low modulation factor is because the reinforcement of a record auxiliary layer becomes high too much and deformation of a metal layer is controlled. If thickness of a record auxiliary layer is especially set to 0.1 micrometers or less, it will be difficult to form a stable record pit, and a block error rate will increase rapidly. From these things, the thickness of a record auxiliary layer is understood that especially the thing set to 0.1 micrometers - about 3 micrometers is desirable.

[0021] In addition, in said example of an experiment, although only the example of an experiment of the optical disk equipped with the metal layer of a golden-tin system was hung up, the result with the same said of the optical disk equipped with the metal layer which consists of other alloys was obtained.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the important section sectional view of the optical information record medium concerning this invention.

[Drawing 2] It is the top view of the optical information record medium concerning this invention.

[Drawing 3] It is the important section sectional view showing the 1st example of the configuration of the Records Department.

[Drawing 4] It is the important section sectional view showing the 1st example of the configuration of the Records Department.

[Drawing 5] It is the graphical representation showing the relation between illumination time amount and change of a modulation factor.

[Drawing 6] It is the graphical representation showing the relation between illumination time amount and change of a reflection factor.

[Drawing 7] It is the graphical representation showing the relation between a presentation and modulation factor of a metal layer, and a reflection factor.

[Drawing 8]It is the graphical representation showing the relation between the thickness of a record auxiliary layer, a modulation factor, and a block error rate.

[Description of Notations]

1 Transparence Substrate

2 Signal Side

3 Organic-Coloring-Matter Layer

4 Metal Layer

5 Record Auxiliary Layer